

What is claimed is:

- 1 1. A device for use in a molten metal pump, the device comprising:
 - 2 an inlet structure defining one or more openings through which molten metal can pass;
 - 3 and
 - 4 a displacement structure connected to the inlet structure, the displacement structure
 - 5 including one or more rotor blades for displacing molten metal;
 - 6 wherein as the device is rotated, both the inlet structure and displacement structure
 - 7 rotate.
- 8 2. The device of claim 1 that further includes a bearing surface.
- 1 3. The device of claim 2 wherein the bearing surface includes one or more grooves to
- 2 help alleviate a build up of molten metal between the bearing surface and a corresponding
- 3 bearing surface on a pump base.
- 1 4. The device of claim 1 wherein the one or more rotor blades are comprised of graphite.
- 2 5. The device of claim 1 wherein the one or more rotor blades are imperforate.
- 1 6. The device of claim 1 wherein the inlet structure is comprised of graphite.
- 1 7. The device of claim 1 wherein the inlet structure is comprised of ceramic.
- 2 8. The device of claim 1 wherein each of the one or more rotor blades has a portion that
- 3 directs molten metal downward into a pump chamber and a portion that directs molten metal
- 4 outward towards the wall of the pump chamber.
- 1 9. The device of claim 1 wherein there are three openings.
- 2 10. The device of claim 1 wherein there are three rotor blades.
- 3 11. The device of claim 1 that includes a threaded connective portion for connecting to a

4 rotor shaft.

1 12. A pump for pumping molten metal, the pump comprising:

2 (a) a motor;

3 (b) a pump base including a pump chamber and a discharge;

4 (c) a device at least partially positioned in the pump chamber, the device

5 comprising:

6 (i) an inlet structure defining one or more openings through which molten

7 metal can pass;

8 (ii) a displacement structure connected to the inlet structure, the displacement

9 structure for displacing molten metal; and

10 (d) a drive shaft connecting the motor to the device;

11 wherein as the device is rotated, both the inlet structure and displacement structure

12 rotate.

13 13. The pump of claim 12 that further includes a superstructure connected to the pump

14 base by one or more support posts.

1 14. The pump of claim 12 wherein the motor is positioned on the superstructure.

1 15. The pump of claim 12 wherein the drive shaft comprises a motor shaft having a first

2 end and a second end, a coupling having a first end and a second end, and a rotor shaft having

3 a first end and a second end, the first end of the motor shaft being connected to the motor and

4 the second end of the motor shaft being connected to the first end of the coupling, the first end

5 of the rotor shaft being connected to the second end of the coupling and the second end of the

6 rotor shaft being connected to the device.

1 16. The pump of claim 12 wherein the device further includes a bearing surface.

- 2 17. The pump of claim 16 wherein the bearing surface includes one or more grooves to
3 help alleviate a build up of molten metal between the bearing surface and a
4 corresponding bearing surface in the pump base.
- 5 18. The pump of claim 12 wherein the displacement structure is one or more rotor blades.
- 1 19. The pump of claim 18 wherein the one or more rotor blades are comprised of graphite.
- 2 20. The pump of claim 18 wherein the one or more rotor blades are imperforate.
- 1 21. The pump of claim 12 wherein the inlet structure is comprised of graphite.
- 1 22. The pump of claim 12 wherein the inlet structure is comprised of ceramic.
- 2 23. The pump of claim 18 wherein each of the one or more rotor blades has a portion that
3 directs molten metal downward and a portion that directs molten metal outward.
- 1 24. The pump of claim 12 wherein the pump base has a tangential discharge.
- 1 25. The pump of claim 12 that is a transfer pump and includes a metal-transfer conduit
2 connected to the discharge.
- 1 26. The pump of claim 25 wherein the metal-transfer conduit is connected to the pump
2 base without the use of cement or other sealant.
- 1 27. The pump of claim 12 that further includes a gas-release device for releasing gas into a
2 molten metal stream generated by the pump.
- 1 28. The pump of claim 31 wherein the gas-release device comprises a gas-transfer conduit
2 having an end connected to the pump discharge for releasing gas into molten metal passing
3 through the pump discharge.
- 1 29. The pump of claim 31 that includes a metal-transfer conduit extending from the pump
2 discharge and a gas-transfer conduit having an end connected to the metal-transfer conduit for
3 transferring gas to the metal-transfer conduit.

- 1 30. The pump of claim 12 wherein there are three openings.
 - 2 31. The pump of claim 12 wherein there are three rotor blades.
 - 3 32. The pump of claim 12 wherein the device includes a threaded connection for
 - 4 connecting to a rotor shaft.
 - 5 33. An impeller for use in a molten metal pump, the impeller for mounting in a pump
 - 6 chamber and for displacing molten metal entering the pump chamber, the impeller including a
 - 7 bearing surface and one or more grooves on the bearing surface, the grooves for reducing the
 - 8 build up of molten metal between the bearing surface and a corresponding bearing surface on a
 - 9 pump base.
- 10 34. A device for use in a molten metal pump, the device comprising:
 - 11 an inlet structure defining one or more openings through which molten metal can pass;
 - 12 and
 - 13 a displacement structure connected to the inlet structure, the displacement structure for
 - 14 displacing molten metal;
 - 15 wherein as the device is rotated, the inlet structure and displacement structure rotate.